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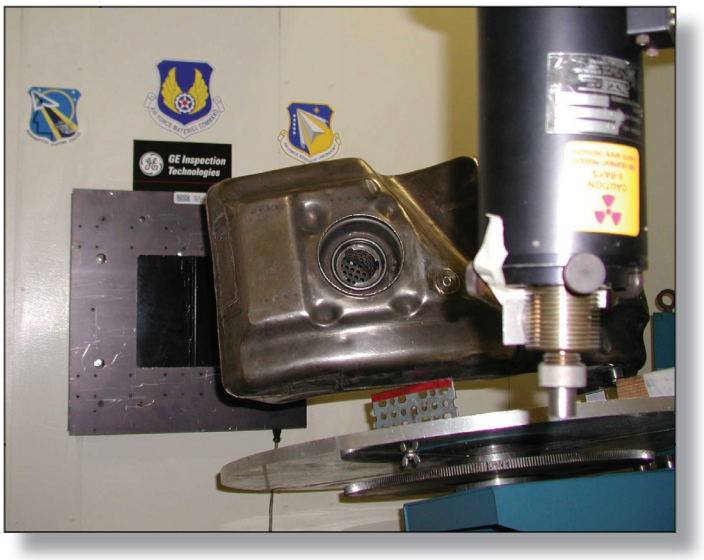
Science and Technology for Tomorrow's Air and Space Force

Success Story

HIGH-RESOLUTION DIGITAL FLAT PANEL X-RAY DETECTOR AND SOFTWARE TRANSITIONED TO OC-ALC



The transition of the high-resolution digital flat panel detector system provides Oklahoma City Air Logistics Center (OC-ALC) personnel with improved nondestructive inspection (NDI) tools for evaluating complex aircraft engine components. Digital radiography (DR) technology offers higher resolution detection capability that users can enhance with software imaging tools to improve an inspector's ability to find anomalies in the captured image. Technicians will use these images to precisely locate and diagnose the defect before initiating the repair process.

DR technology increases the probability of defect detection due to its enhanced resolution and sensitivity over the previous intensifier detector system. Digital X-ray flat panel detector systems can achieve this higher resolution because image intensifier systems have significant blurring due to X-ray scattering, whereas digital flat panel detector systems significantly reduce this X-ray scatter due to the detector elements' compact design.

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Accomplishment

Researchers from the Materials and Manufacturing Directorate transitioned a new high-resolution digital flat panel X-ray detector system and its respective image processing software to the OC-ALC Engine Tank and Cooler Inspection Facility for real-time radiographic inspections of TF-33, F-100, and F-110 engine oil tanks and coolers used on C-141, B-52, F-15, and F-16 aircraft. This system provides image archiving capability, enhanced performance, improved productivity and, best of all, higher resolution and sensitivity over the previous image intensifier detector system.

Background

Inspectors use X-ray radiography inspection extensively throughout the life cycle of the aircraft. Aircraft manufacturers use this type of NDI during component manufacturing and during aircraft structural assembly to evaluate the integrity of welded joints for porosity and voids.

Depot workers use X-ray inspection during the maintenance of aging aircraft to inspect internal structures and honeycomb material for core damage, internal moisture, corrosion, and to evaluate internal geometries in turbine engine components for cracking and weld anomalies. NDI inspections are useful because they eliminate the need for unnecessary maintenance and aircraft disassembly, which are time-intensive and can potentially create additional damage and problems in aging Air Force systems.

The directorate's Nondestructive Evaluation Branch recently contracted with Marietta X-Ray, Inc. (MXRI) to evaluate and assess the performance of various commercial off-the-shelf hardware and software systems from several X-ray detector platforms using aircraft components. MXRI of Marietta, Georgia, chose the General Electric DXR-250RT flat panel detector system and the General Electric Radworks 5.1 imaging software to best meet the inspection requirements of the Engine Tank and Cooler Facility at OC-ALC.

The system's transition marks the completion of the first phase of the Digital Radiography Insertion Program (DRIP) that focuses on specific Air Force depot applications for DR to improve overall depot NDI production capabilities and productivity. The Aeronautical Systems Center's Aeronautical Enterprise Program Office and OC-ALC's NDI production unit manage the DRIP program.

Materials and Manufacturing
Technology Transfer

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (03-ML-12)